REMARKS

The Applicant thanks the Examiner for his detailed comments. Amendments have been made to the specification and claims 1, 3, 60, 61. The amendments to claims 1, 3 and 61 correct formal matters. Claim 60 has been amended to depend from claim 1.

Drawings

A detailed illustration of an adhesion layer is not essential for a proper understanding of the invention. The adhesion layer forms *in situ* during processing as described in paragraph [0041], for example. The adhesion layer is claimed in a product by process limitation. Nevertheless, the Applicant includes a new Fig. 20, which illustrates schematically an adhesion layer 210 on a portion of an electrode 26 adhering a nanofiber cluster 30 to the electrode 26. This is described in paragraph [0041] and no new matter has been added by the schematic drawing of Fig. 20.

With regard to objections of the drawings of Figs. 1 and 2, amendments to the specification identify reference numbers "24" and "28" of Figure 1 and reference number "30" of Figure 2. A brief description of Fig 20 is added. No new matter has been added by any of the amendments.

Claim Objections

With respect to rejection for antecedent basis, claim 1 has been amended to correct a clerical error, without limiting claim scope. No new matter has been added.

Paragraphs 9-40: Summary of Responses to Anticipation and Obviousness Rejections

Lee does not disclose "a field emission device....a plurality of fibrous clusters...each of the plurality of fibrous clusters comprising a plurality of nanofibers grown from a catalytic particulate cluster adhered to the conductive electrode by an adhesion layer, the adhesion layer being formed during processing of a catalyst precursor,...such that at least a portion of the plurality of fibrous clusters have a hemispheroidal shape." The Applicant traverses the rejections based on Lee, which merely describes a triode structure adapted to limit damage to

CNT films of the prior art that are easily damaged as taught in Lee at paragraphs [0006] and [0013], for example. The fibrous clusters of the present invention are a new advance, which provides for "hemispheroidal clusters, having advantageous morphology and bond strength that is not produced by other methods of fabricating carbon nanofiber based emissive films," as disclosed in paragraphs [0038] through [0040], for example.

The disclosure of Lee fails to disclose any process for producing the structure claimed in the product by process limitation of Claim 1. Lee must enable a person of ordinary skill in the art to make and use the claimed invention to render the claimed invention unpatentable. *In re Kumar*, No. 04-1074, (Fed. Cir. 2005). Lee fails to teach any process of forming fibrous clusters, with or without an adhesion layer. An adhesion layer is defined by the product by process limitation of claim 1 and the examples in the specification. An adhesion layer is not merely a layer of adhesive, because the structure is substantially different, resulting from chemical reactions during processing, such as described in paragraphs [0062] to [0065] of the specification.

In paragraph 33, Lee describes the emitting layer as made of a "CNT film, nano-particles (such as carbon sphere, nano-cluster or CNF), a diamond film, or porous silicon." Nano-clusters are a form of nano-particles, according to Lee's definition, which mean that nano-clusters cannot describe fibrous clusters. Also, a CNT film is disclosed by Lee as those CNT films, known in the art, which have the shortcomings of being easily damaged during processing and causing short circuits during operation as disclosed in paragraph [0004] to]0010] of Lee. Lee does not disclose any new process for forming CNT films or nano-clusters. Lee never mentions anything about a hemispheroidal shape of a CNT film. Paragraph 33 only teaches the way of fabricating a triode structure, which has nothing at all to do with growing fibrous clusters having a hemispheroidal shape. There is no support at all in Lee for this limitation. Instead, Lee specifically addresses thin films of CNT's.

Paragraphs 7-33: Anticipation

Lee does not disclose each and every limitation of claims 1-6, 9-12, 14-17, 20-35 and 60-65. Now referring to Claim 1, the field emissive device of Lee does not disclose "fibrous

clusters" as these are defined by the product by process limitations of Claim 1. As discussed in the summary, Lee fails to enable one of ordinary skill in the field to make and use the claimed invention. Indeed, Lee fails to disclose any process or structure remotely related to fibrous clusters. In order to anticipate a claim, a reference must disclose each and every limitation exactly. Lee fails to disclose each and every limitation of Claim 1, exactly. Specifically, Lee fails to disclose the following structures: "fibrous clusters," an "adhesion layer," and a "hemispheroidal shape." As a result, Claim 1 is not anticipated by Lee.

All of the pending claims now depend from Claim 1, incorporating all of the limitations of claim 1, and additional limitations. Therefore, Lee fails to anticipate any of the pending claims.

Paragraphs 34-40: Obviousness

Claims 7-8

The general knowledge of one skilled in the art fails to teach or suggest the limitations omitted by Lee. Specifically, no prior art process is capable of creating fibrous clusters by *in situ* growth from catalyst precursors producing an adhesion layer and a hemispheroidal shape. Moreover, as discussed in paragraph [0050], the cylindrical diameter of carbon nanofibers correlate with the size of the active catalyst particulates used in catalytic growth of the carbon nanofibers. Hence, it is improper hindsight to suggest routine experimentation to yield the present invention. Nothing in Lee or the knowledge of one skilled in the art teach or suggest the process of making the pre-catalytic particulate clusters of the present invention, and the choice of processing steps is non-obvious. The steps eventually lead to catalytic particulate clusters of the size produced with an adhesion layer between the catalytic particulate clusters adhered to the electrode. Lee fails to establish even *prima facie* obviousness, because Lee fails to teach every limitation of claim 1. Hence, claims 7-8 and 13 are non-obvious. The limitations omitted from Lee were not generally known in the art and any suggestion of this is merely improper hindsight.

Claims 18-19

The applicant first notes that the density and size of nanofibers is controlled by the amount and density of non-catalyzing particles and the amount of catalyst in solution, as noted in paragraph [0061]. Furthermore, the length of the nanofibers themselves is controlled by the

CVD process, which may be terminated when a desired length is reached, as noted in paragraph [0069]. No reference is cited that indicates the morphology of fibrous clusters as recited in claim 1 and described in the examples of the specification. There is no teaching regarding the benefit of fibrous clusters as that term is described in the recitation of claim 1 and throughout the specification. Nothing teaches the shape, size or length desirable for such fibrous clusters. Therefore, an ordinary artisan would have no way of modifying the cited references in order to obtain the structure recited in claim 1. Claims 18 and 19 depend from claim 1 and include specific structural limitations to the ration of major axis of hemispheroidal fibrous clusters and the mean outer cylindrical diameter of the nanofibers. Since no ordinary artisan knew of the process prior to the present invention, the skill of an ordinary artisan fails to teach or suggest limitations omitted from Lee. Any suggestion of this is merely improper hindsight.

Ante-dating of Lee

The declarations of Xinhe Tang and Theodore Schmitt, which are attached, antedate Lee. Specifically, the inventor, Tang, reduced the claimed invention to practice prior to the filing date of Lee, as corroborated by the 132 Declaration of Theodore Schmitt, a non-inventor, and Exhibits A-C. Exhibit A is a true and accurate copy of a report of a test completed on sample no. V171002a, which emitted light on October 17, 2002, which corroborates a successful test and reduction to practice of the claimed invention prior to Lee. This is supported by Schmitt's declaration. Exhibit B is a true and accurate copy which shows the date of the first test, on November 20, 2002 of an emitter having 100% emission from the emitting area, and Exhibit C is a report of the test including images of the light emission of the field emissive device with a 100% emitting area during the test and a graph of current density versus field strength. Exhibit C reports additional test results conducted by LG Phillips Laboratory that achieved light emission at field strengths of 1.5-2 V/μm. These exhibits are also corroborated by Schmitt's Declaration. Therefore, the facts in the declaration of the inventor, Tang, is corroborated. The facts recited by Tang clearly show a date of reduction to practice prior to the filing date of Lee. Thus, Lee is antedated.

The Applicant respectfully requests that the amendments be entered and favorable allowance of the application is requested.

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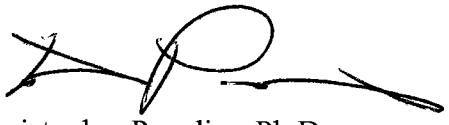
Respectfully submitted,



Christopher Paradies, Ph.D.
Registration No.: 45,692
FOWLER WHITE BOGGS BANKER
501 East Kennedy Blvd., Suite 1700
Tampa, Florida 33602
Telephone: (813) 222-1190

CJP: JSP: kat
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